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1996/06/14

THE DRAGON'S NEW TEETH:

China's Future Unmanned Air and Space Forces

by

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A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Strategy and Policy Department [Global Advanced Research Project].

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

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Executive Summary of

THE DRAGON'S NEW TEETH: China's Future Unmanned Air and Space Forces

Thesis: Presently the PLAAF is a numerically impressive manned air force, but only a defensive force which is under-equipped and under-trained. What offensive forces exist are found in the strategic, operational, and tactical missiles already possessed by the PLA, PLAN, and PLAAF. In fact, the Chinese view missiles as one of the best ways to improve the operational effectiveness of Chinese Armed Forces in the short term. As opposed to manned air forces, these three levels of missile forces, strategic, operational, and tactical, represent the real offensive power of the Chinese military.

Central Proposition: As the Chinese are not yet an "air-faring people", China will only emulate the Western air forces to a limited degree. Due to historical trends, Chinese air and space power will rely on "politically dependable" missile-forces for its airpower and to generate prestige and hard currency.

Organization: This paper is organized as descriptive narrative of these air and space power missile assets and is divided into three parts. The author first describes the extreme backward nature of the PLAAF. In this first part part the author concludes that "[a]lthough China clearly has the numerical upper hand in terms of force levels and equipment, in the areas of sophisticated, high-performance weaponry and support systems, the PLA[AF] is still lamentably under-equipped." Their aircraft are obsolete, their training insufficient, and their doctrine outdated and only supportive in nature, Chinese manned airpower will be only of limited effectiveness in the near future for

anything but a defensive role. At least in the near term, China must turn to other solutions to solve its air and space power needs.

In the second part, the author describes in turn the unmanned air and space tools that China may use for offensive operations. This part includes sections on Space Force Multipliers, Strategic Nuclear Forces, and Theater and Naval Missile Forces. Altogether China has a robust, and in some regards, threatening space program. Modern launch facilities are been completed and upgraded, reliable launch vehicles are being designed and flown, and a host of satellites demonstrating great capability are being prepared to go into orbit. Unfortunately, many of these capabilities also have military. China appears to have a strategic nuclear weapons program whose capability is only accelerating in nature, including a road mobile ICBM force. Furthermore, China continues to expand its theater ballistic and cruise missiles. These systems, aided by GPS, may represent substitutes for other weapons and platforms used in the West, such as manned aircraft, or they may be somethng permanent in the Chinese arsenal.

Finally, in the last part the author discusses some trends in the near-term indicators for assessing the future strength of Chinese air and space forces. Chinese purchase of long-range fighter interceptors like the SU-27, acquisition of aerial refueling capability, as well as improvements in space-borne ISR assets, China continues to make strides in its power projection capabilities. More importantly, as China continues to nurture and improve these technologies, they may become even more threatening to its neighbors and Western weapons systems which may encounter them in many parts of the globe due to Chinese arms sales.

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Abstract of

THE DRAGON'S NEW TEETH: China's Future Unmanned Air and Space Forces

As the upcoming regional hegemon in SEA, the PRC will modernize her air and space doctrine and force structure in order to achieve her national goals. The US and her allies are watching to see if China will modernize her military for offensive operations in support of its new "Local Wars" doctrine. Presently the PLAAF is a numerically impressive manned air force, but only a defensive force which is under-equipped and under-trained. What offensive forces exist are found in the strategic, operational, and tactical missiles already possessed by the PLA, PLAN, and PLAAF. In fact, the Chinese view missiles as one of the best ways to improve the operational effectiveness of Chinese Armed Forces in the short term. As opposed to manned air forces, these three levels of missile forces, strategic, operational, and tactical, represent the real offensive power of the Chinese military in the years to come.

This paper is organized as descriptive narrative of these air and space power missile assets. First described, however, will be the extreme backward nature of the PLAAF. Then described in turn the unmanned air and space tools that China may use for offensive operations. These include Space Force Multipliers, Strategic Nuclear Forces, and Theater and Naval Missile Forces. Finally, some trends for the near-term will be discussed as indicators for assessing the future strength of Chinese air and space forces.

Preface

> Aerospace doctrine is, simply defined, what we hold true about aerospace power and the best way to do the job in the Air Force. It is based on experience, our own and that of others. Doctrine is what we have learned about aerospace power and its application since the dawn of powered flight. While that can be applied without modification to present and future situations, it does provide the broad conceptual basis for our understanding of war, human nature, and aerospace power . . . . It is the starting point for solving contemporary problems. (Air Force Manual 1-1, page 1)

In the exploration of any future military force structure, it is difficult not to discuss military doctrine. Discussing doctrine, specifically its definition and application, can lead to intense and passionate debates. Among military professionals of various services and learned academians of many institutions this definition differs by degrees both in its fundamental purpose and in its application of the military instrument of policy. Since this is a paper about air and space power, sometimes collectively termed aerospace power, it is fitting that the aerospace doctrine of the United States Air Force as a starting place for this discussion of future Chinese aerospace power.

For this author, aerospace doctrine comes in two divisions of the classic 'who, what, where, when, why, and how'. The first division is the 'why, who, and what' is one form of doctrine and the second division is the 'where and how' is another form. Much of the debate over what is doctrine stems from advocates of one of these forms as being true doctrine, while arguably both forms are really parts of a greater whole. This point is better understood

and the differences between these two forms of doctrine are best conceptualized by an example from the pre-history of the United States Air Force.

Consider the development of the doctrinal concept of strategic bombing by the United States Army Air Corps. Visionaries such as Douhet and Trenchard believed in the concept of an independent Air Force performing massive strategic bombing would win the wars of the future. Although popularized in the Disney movie "Victory through Air Power", this concept led to the need for an entirely new weapon system, a large four-engine bomber, a Flying Fortress, to perform this new doctrinal mission. Especially for air forces because of the infancy of aerospace power, doctrine can precede weapon systems. This preceding first form of this new doctrine, the 'who, what, and why' is but one part of doctrine development: In this example, they are independent airmar., flying a new strategic bomber, to win wars through strategic bombing. The second form of doctrine, the 'where and how' of strategic bombing took several painful years of war to perfect. Some fifty years later, there are many who would argue this process continues around the world today.

Today China is rightfully stepping into the forefront of the world scene as she economically grows and modernizes. Specifically of concern to the United States military establishment is how the China will modernize her armed forces. The difference between a peacefully intentioned China and a potential adversary will be types and purposes of these modernized forces. Of greatest concern to the United States and her allies in SEA will be the development of forces capable of power projection far from China's borders, and this means in many instances air and space forces. As in the example of the fielding the strategic

bomber during World War II, Chinese national security strategy and aerospace doctrine will determine both the types and purpose of these modernize aerospace forces.

Yet peering into the window of a future Chinese doctrine is foggy affair. Regarding the components of the first form of doctrine, it is more often easier to discuss the 'who and the what' of military doctrine as these are represented by physical organization and tangible hardware. This in itself can be insightful. What is more useful, however, is the ability to answer the 'why' and from a military planning standpoint the second form's 'where and how'. Many of the weapon systems China will field in the future will resemble those in the West because the 'why' is often the same. More critical to military planning is that 'where and how' of their employment may differ greatly from the Western models. Without belaboring an often made point, Eastern thinking is subtlety different than Western thinking, especially in regards to military strategy and tactics. This is perhaps why, as a Western educated writer and military professional, predicting the future of Chinese doctrine and forces is a difficult affair.

Nevertheless, the challenge must be met. No one likes surprises, and as a basic tenet of warfare, the military likes surprises least of all.

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December 1995

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THE DRAGON'S NEW TEETH:

China's Future Unmanned Air and Space Forces

"China is destined to be the world's largest economy "
- Admiral Owens, Vice Chairman of the Joint Chiefs of Staff[1]

China matters. South East Asia (SEA) is booming, and as a nation of 1.2 billion people, one-fifth of the world's population, China represents the future leading market in the region in the near-term, and the world in the not so distant future. It may be true that "Economic, not military, expansion will be the hallmark of the Asia/Pacific region in the 1990s."[2] Yet, as the world's largest economy, in the words of Admiral Owens, "It matters whether China spends 3 percent of its GDP, or 6 percent on its military."[3] China's rapidly expanding economy will finally enable her to become the world power envisioned by Roosevelt at Yalta as every facet of the Chinese nation modernizes.

The facet of specific of concern to the national security of United States and its military establishment is how the China will modernize her armed forces. "Especially offensive, [US officials] said, are the allegations by the U.S. that China is modernizing its military forces as a prelude to exercising more influence over its neighbors and extending its control in the Western Pacific and South China Sea."[4] While the US has never been worried about the offensive capability of every nation around the world, the former US ambassador to the

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[1] From the closing speech delivered to the General Marshall Conference, hosted by George Washington University, February 11, 1996.
[2] Mecham, Michael, "China Updates Its Military, But Business Comes First", Aviation Week & Space Technology, March 15, 1993, pp 57-59
[3] Ibid, Owens speech
[4] _____, "U S and China Should Cool Their Rhetoric", Aviation Week & Space Technology, May 17, 1993, p 88

United Nations Jeane J. Kirkpatrick makes an important point. "How a government uses power in dealing with its own citizens provides important insights into how it is likely to behave in dealing with other governments."[5] In this regard, China's track record has not been good.

Ambassador Kirkpatrick goes on to say that "We cannot assume that China's leaders will act with reliable restraint aboard--unless the rest of the world provides clear incentives to do so." One clear incentive to dissuade China from abusing her neighbors will be building credible deterrent forces and security arrangements in the region. In order to do this, the US and the nations of SEA must understand the future composition of the modernized China's armed forces that they must deter. The difference between a peacefully intentioned China and a potential adversary will be types and purposes of these modernized forces.

The types and purposes of these forces are governed by military doctrine. Recently, the traditional strategic doctrine of the "People's War", which relied on numerically massive forces and attrition, has been replaced by the new "Peripheral Defense". This new doctrine "would maintain capabilities to deter major aggression and develop the mobility and flexibility to be certain of winning small to medium-scale wars and to prepare for, or deter, medium to large-scale wars."[6] More recently, "Peripheral Defense" has been replaced by the present concept of "Local Wars". This most recent doctrine requires no national mobilization, would be conducted in a "hit and run" fashion, and conflicts would be viewed

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[5] Kirkpatrick, Jeane J., "A Question of Intent", The American Enterprize, November/December 1994, p 75
[6] Yuan, Jing-Dong, "China's Defense modernization: Implications for Asia-Pacific Security", Contempory Southeast Asia, June 1995, p 69

as lasting only a short duration.[7] With these doctrinal transitions in mind, what types of forces would China be interested in acquiring to support the "Local War" doctrine?

China's recent arms and technology acquisitions have several distinctive features that may indicate what is meant by this new doctrine in terms of the weapon systems required to perform its constituent missions. First, the amount of money spent and the number of weapons acquired has been unprecedented, at a time of reduced threat to China's security due to the fall of the Soviet Empire.[8] This doctrinal change can viewed as both dramatic and perhaps time critical. Second, according to Michael Swaine, Rand Corp expert on the PLA, "Current trends toward the acquisition of a significant power-projection capability [author's emphasis] can thus be at least partly understood as an expression of these emergent forces."[9] Many military analysts, as well as US specialists, view China's actions in the South China Sea as being designed to give it power projection capability. A US official went on to say, "China's actions make me worry about China not being a status quo power."[10]

This is why of greatest concern to the United States and her allies in SEA will be the development of forces capable of power projection far from China's borders, and this means in many instances air and space forces. A quick review of China's aerospace muscle reveals a numerically impressive force, even when compared to the United States Air Force:

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[7] Fulghum, David A. and Mecham, Michael, "Chinese Tests Stun Neighbors" Aviation Week & Space Technology, July 31, 1995, p 23

[8] Ibid

[9] Swain, Micheal D., "The PLA and China's Future", Far Eastern Economic Review, March 4, 1993, p 25.

[10] Hamzah, B A., "China's Strategy", Far Eastern Economic Review, August 13, 1992, p 16-22.

Troops	**470,000**
Bombers	**470**
Fighters	**4,500**
Support Aircraft	**1,040**
ICBMs	**14**
IRBMs	**60**

Table 1: Overview of PLAAF[11]

Nevertheless, according to researcher at the University of Hong Kong, "Although China clearly has the numerical upper hand in terms of force levels and equipment, in the areas of sophisticated, high-performance weaponry and support systems, the PLA[AF] is still lamentably under-equipped."[12] This characterization of the manned weapon systems of the PLAAF will be discussed in detail later in this paper.

If such a large but outdated force does not represent a significant threat to the larger guarantors of security in the region, what does? China does possess aerospace forces, some feilded by its army (PLA) and its navy (PLAN), that will enable it to achieve its aims through military means. These instruments are presently being acquired or modernized as not only part of China's economic expansion and domestic needs, but also as part of its impressive military build-up. These instruments may be the strategic, operational, and tactical missiles already possessed by the PLA, PLAN, and PLAAF. One expert believes "Missiles being viewed as one of the best ways to improve the operational effectiveness of Chinese Armed

[11] Post, Tom, "Prying Open a Secret Army", Newsweek, October 31, 1994, p 49. Source: IISS
[12] Yuan, Jing-Dong, "China's Defense modernization: Implications for Asia-Pacific Security", Contempory Southeast Asia, June 1995, p 83.

Forces in the short term."[13] As opposed to manned air forces, these three levels of missile forces, strategic, operational, and tactical, represent the real offensive power of the Chinese military in the years to come.

This paper will be organized primarily along a descriptive dialog of these air and space power missile assets. First described will be the extreme backward nature of the PLAAF and why Not Manned Airpower will not be the primary instrument of power projection of China's military might. What will follow in turn will be a discussion of the unmanned air and space tools she may to use. These include Space Force Multipliers, being composed of space lift capability, satellite assets, and launch infrastructure. Next will follow a discussion of China's Strategic Nuclear Forces, recently gone road-mobile, and a key deterrent force in any future conflict. Under the subtitle of Theater and Naval Missile Forces, both China's intermediate ranged missiles and anti-ship missiles will be presented. Finally, some trends for the near-term will be discussed as indicators for assessing the future strength of Chinese air and space forces.

On face value, these unmanned systems may not seem like aerospace power as traditionally thought of in the West. Yet, it is significant that the US Air Force doctrine states that Air Control and Space Control as the two most important doctrinal missions. How a nation goes about achieving these critical missions must be tailored to each nation's individual situation. The difference in situations being dependent upon the manpower, money, technology, and time available before these missions will have to be performed. Especially for China, this correlation of her situation and available assets is unique.

[13] Jacobs, G., "China's Naval Missiles", Asian Defence Journal, October 1990, p 65.

Not Manned Airpower

"If you know the enemy and know yourself, you need not fear the result of a hundred battles." ~ Sun Tzu

The China's new teeth will not primarily come from her manned air forces for some time to come. The bulk of today's PLAAF is composed of obsolete aircraft. In contrast to the first generation jets of the Korea War, where the Chinese Mig 15s and US F-86s were roughly equal in performance, during the last forty years the PLAAF has fallen behind the West in fielding modern aircraft. "Other than the 26 Su-27s acquired from Russian in 1992, virtually every aircraft in the Chinese inventory is based on 1950s and 1960s technology."[14] With the introduction of these Su-27s, the PLAAF has only begun to field "fourth generation" fighters, equivalent to the F-14s, F-15s, F-16s, and F-18s introduced by the West in the '70s, and this represents a twenty year gap in capability.[15] Table 1 in the appendix summarizes the current order of battle for the PLAAF manned aircraft.

Surprisingly for a country with over a billion people, a manpower gap also exists for the PLAAF. The PLAAF emerged from the Cultural Revolution of the seventies as an organizational shell due to the decapitation of its leadership and country-wide upheaval.[16] This leadership vacuum created poor unit readiness due to the lack of proper training. Primarily, PLAAF pilots "simply do not fly the same number of hours as their Western counterparts and mostly fly navigation flights."[17] Generally speaking, PLAAF fighter pilots

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[14] Allen, Kenneth W., Krumel, Glenn, and Pollack, Jonathan D., China's Air Force Enters the 21st Century Project AIR FORCE, RAND Corporation, MR-580-AF, 1995, p135.
[15] Ibid, p 140
[16] Ibid, p 79-80
[17] Ibid, p 127

fly 100 to 110 hours per year, bomber pilots 80 hours per year, and A-5 ground attack pilots fly up to 150 hours per year.[18] This is roughly half of equivalent US pilots. Although the emphasis has been for 'training the way you fight' with a requisite 50 percent increase if flying time per year, this has not occurred and other serious deficiencies in training capability exist.[19] These include lack of joint training, limited simulator time, and poor training opportunities.[20]

Clearly, while the PLAAF needs capital for both equipment modernization and training, any modernization would be of little use without also modernizing China's air power doctrine. In every sense, the doctrine the PLAAF is at least fifty years behind its modern Western counterparts. While the United States Air Force became a separate armed service in 1947, today's PLAAF, as the name applies, is still only a separate combat arm of the People's Liberation Army (PLA). The PLA's "current strategy of 'active defense' consists of taking tactically offensive action within a basically defensive strategy" designed to wear down the enemy.[21]

As a component of the Army, it is not surprising that the PLAAF's strategic policy is named "giving priority to resisting the attack" and engenders the two primary missions:[22]

1. To Provide air Defense
2. To Support the Ground Force

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[18] Ibid, p 130
[19] Ibid, p 133
[20] Ibid, p 5
[21] Allen, Kenneth W., People's Republic of China, People's Liberation Army Air Force Defense Intelligence Agency, U S Government Printing Officer, 1991, p 3-1.
[22] Ibid

The first mission is what the West would call defensive counter air (DCA), and as for the second mission, given the limited combat range of PLAAF forces, perhaps close air support (CAS) would be the most applicable translation.[23]

These ground support missions demand five *doctrinal requirements* with summary explanations of the best use of aviation troops (author's summary of the requirement follows the dash):[24]

1. Active Support - actively support the ground force victory
2. Concentrated Use of Air Power - limited air assets employed in a maximum effort
3. Flexible Mobility - use air power's ability to concentrate and disperse
4. Close Coordination - employment of combined arms to support ground operations
5. Tight Protection - defend aircraft, personnel, and facilities

From these *doctrinal requirements*, the PLAAF can execute what is described as six specified ground support missions called *Combat Actions*. These six Combat Actions include:[25]

1. Seizing local air superiority at key times in the campaign
2. Destroying enemy preparations to attack
3. Supporting ground forces in resisting enemy attack and holding major defensive areas

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[23] Basic Aerospace Doctrine of the United States Air Force Air Force Manual 1-1, Vol I Washington: Department of the Air Force, March 1992, p 6

[24] Ibid, Allen, p 3-4

[25] Allen, Kenneth W., People's Republic of China People's Liberation Army Air Force Defense Intelligence Agency, U S Government Printing Officer, 1991, p 3-10 thru 3-16

4. Supporting ground force unit counterattacks

5. Coordinate with ground force units to destroy airborne troops

6. Aerial reconnaissance

For comparison to Western aerospace doctrinal thought, ignoring the early World War II concepts like strategic bombing, the PLAAF compares well to the North African USAAC of 1942. "Lessons from the Persian Gulf war have not been lost on the region. Electronic warfare, in-flight refueling, antiballistic missile defenses and longer-range air-to-air missiles are priorities for those that can afford them."[26] While the 26 operational Su-27s, fielding the new F-10 by the year 2000, modifying their H-6 bombers for air refueling and electronic warfare,[27] and other future improvements to existing aircraft may herald a change in thinking in the PLAAF. Nevertheless, during the next 15 years must modernize its doctrine as well as its training and equipment in order to be more than a bully to the smaller nations of SEA.

In summary, "[a]lthough China clearly has the numerical upper hand in terms of force levels and equipment, in the areas of sophisticated, high-performance weaponry and support systems, the PLA[AF] is still lamentably under-equipped." [28] Therefore, as their aircraft are obsolete, their training insufficient, and their doctrine outdated and only supportive in nature, Chinese manned airpower will be only of limited effectiveness in the near future for anything

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[26] Mecham, Michael, "China Updates Its Military, But Business Comes First", Aviation Week & Space Technology, March 15, 1993, pp 57-59

[27] Allen, Kenneth W., Krumel, Glenn, and Pollack, Jonathan D., China's Air Force Enters the 21st Century Project AIR FORCE, RAND Corporation, MR-580-AF, 1995 Appendix B

[28] Yuan, Jing-Dong, "China's Defense modernization. Implications for Asia-Pacific Security", Contempory Southeast Asia, June 1995, pp 67-85

but a defensive role. At least in the near term, China must turn to other solutions to solve its air and space power needs.

Space Force Multipliers

"Developing and using the resources of space in the service of mankind represent an objective toward which the countries of the world are striving."[29]
~ Zhang Rufan, Standing Committee Member and Deputy General Secretary of Beijing City Political Consultative Conference.

Specifically for dual use in both the civilian and military sectors, China's space lift capability and space infrastructure are impressive. With three large launch facilities, a new test center, and a range of commercially competitive launch vehicles[30], China maintains a state of the art space program. Moreover, it continues to place numerous satellites in various orbits for both domestic use and as part of commercial sales. The importance of leadership in space to Beijing cannot be overemphasized. According to a communist party leader, "The development of China's space technology is one its great achievements in science and technology. It not has provided a major impetus to China's modernization and defense buildup, but also has been an important factor in stabilizing the world situation and balancing world military strength."[31]

[29] Rufan, Zhang, "Prospects for Development of China's Space Technologies Reviewed", Aerospace China, June 19, 1994, pp 6-10, [FBIS trans JPRS-CST-94-019]
[30] The United States authorized the sale of two satellites to be launched on Chinese rockets. Oliver, April, "The Dragon's New Teeth", The Nation, February 21, 1994, p 229
[31] Rufan, Zhang, "Prospects for Development of China's Space Technologies Reviewed", Aerospace China, June 19, 1994, pp 6-10, [FBIS trans JPRS-CST-94-019]

Today, the importance of developing aerospace technology is being increasingly recognized by China, and Liu Jiyuan points out three areas of importance in a translated article for Aerospace China:[32]

1. Aerospace Technology is an important indicator of national strength; it plays a special role maintaining China's national prestige in the international community.

2. Aerospace Technology is an important indicator of productivity of an advanced society; it plays an important role in the effort to reach China's strategic targets.

3. Aerospace Technology is the precursor of modern science and technology; it plays a leading role for technology advancement and scientific development.

From these broad, yet strong statements, clearly China views Aerospace Technology as crucial to its success and its future strength in the world.

The first aspect of this strength is the space launch facilities. The first of these is the Xian Domestic Satcom Earth Station. Begun on July 23, 1991, in consists of two 13 meter antennas and one 9 meter antenna plus ground support facilities, and was financed, outfitted and equipped by the United States and Canada.[33] This modern, integrated station with full monitoring capability. It can perform tracking and control functions not only for low-altitude and medium altitude satellites, but also for sun synchronous and geo synchronous satellites. It can also provide monitoring support for such activities as satellite on-orbit management

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[32] Jiyuan, Liu, "Strategic Position and Role of Space Activity in China", Aerospace China, May 1993, pp 3-5 [FBIS trans JPRS-CST-93-015]

[33] Zhenqing, Zhou, "Xian Domestic Satellite Communications Earth Station Construction Begins", Shaanxi Ribao, July 30, 1991, p 1, [FBIS trans JPRS-CST-91-021]

and launch of commercial satellites.[34] Of military significance is that most Intelligence, Surveillance, and Reconnaissance (ISR) satellites use sun-synchronous or polar orbits while Global Positioning Satellites are in geo-synchronous orbits. Thus, this new station, while primary used for commercial use, also has important military tracking capabilities. Construction of this facility was completed on May 17, 1993.[35]

A more recently announced facility is the Beijing Center of Space Technology Development and Testing (BCST). Begun on October 28, 1994, it is reported that BCST will be the research and test base for China's spacecraft. It includes laboratories for controls and guidance, structure mechanism, radio communication, and data management; as well as factory buildings, final assembly and evaluation structures, and experiment structures.[36] This facility is designed for high standard development of application satellites and other spacecraft.[37] This facility is probably connected with the proposed future manned space program and shuttle program. In analogy, sort of a Houston Center combined with some of the facilities found at Cape Kennedy.

Along the lines of strictly military uses, residents of Lanzhou in northwest China turned their air force guided missile testing base into a "surface to air missile city". Located in the Great Badain Jaran Desert where conditions are extremely difficult, this new base is allegedly undertaking 100 scientific research tasks and six large projects while garnering

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[34] _____, "Xiamen Space Monitoring Station Completed", Science andTechnology Daily, June 18, 1993, p 1 [FBIS trans JPRS-CST-93-015]

[35] Ibid

[36] Lianghua, Yang, "Promote Development and Testing of Spacecraft to High Standard. China Begun Construction of Modern Aerospace Center Foundation Stone Laid for Beijing Center of Space Technology Development and Testing", Renmin Ribao News, October 28, 1994, [FBIS trans. CST-95-004]

[37] Ibid

many awards.[38] Such a change of mission for this important facility may mean an increased emphasis on SAMs over manned aircraft missiles. It could also be related to efforts in exploiting the technology of the recently acquired SA-10c.

Despite these most recent developments for the future, the past "Pride of China's Space Industry" in terms of launch facilities has been and will continue to be base 067, located in Shaanxi Province, for many years to come. It has been the main launch center and the source of 24 of China's 26 successful launches since operations first began on November 26, 1975 and continue today.[39] It is also the site of the failed launching of Australian's Aussat telecommunications satellite, built by Hughes Aircraft Co.[40]

While Base 067 will be the mainstay for commercial launches, "China also plans to upgrade and build new launching facilities at the Jiuquan and Xichang launch centers to test second generation launch vehicles, and to launch earth synchronous and polar orbital satellites."[41] The purpose of these two special orbits has already been highlighted, and these facilities are perhaps being upgraded for just these reasons. Moreover, while these upgrades should be completed by the year 2000, building will continue in preparation for the technical, launch and retrieval infrastructure for a state-of-the-art space-earth transportation system and space station.[42]

All these facilities are robust, but equally robust are China's dual purpose launch vehicles. Deploying a series of Chang Zeng or "Long March" Carrier Rockets, China

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[38] Zhu, Cao, "Xinhua Highlights Missile Testing Base in Northwest", Beijing Xinhua Domestic Service in Chinese, January 10, 1994 [FBIS trans. JPRS-TND-93-003]
[39] Chengyu, Cui and Quncheng Zhang, "Base 067 – The Pride of China's Space Industry", Beijing Review, April 23-29, 1990, p 38-39
[40] Ibid
[41] Wenqi, Li, "China Plans to Send Astronauts Into Space in 8 Years, Build Space-Earth Shuttle System and Space Station by Year 2020", Jiefang Ribao, April 12, 1992, p 1, [FBIS trans JPRS-CST-92-010]
[42] Ibid

adheres "steadfastly to uphold the principle of independence and self-reliance, while actively learning and introducing foreign advanced technology."[43] This principle has made China competitive in commercial launch capability as well as provide the means to deploy siloed strategic nuclear missiles. Initially the Chinese relied upon Soviet technology to produce their rocket, the two stage Dong Feng (East Wind) One strictly for military use.[44] Since then the Chinese have labored to produce a host of rockets, all with civilian commercial applications. A summary of these lift vehicles appears in Appendix 2.

The CZ-2 and CZ-3 series are based on the continued development of both liquid and solid boosters and individual stages, and these series have many stages in common. With this in mind, many of the components can be mixed and matched to produce as wide range of lift capability.[45] This range in capability is seen in the plethora of designations seen in the civilian nomenclature in Appendix 2. While the details can be seen in the references, needless to say, using the CZ-4 three stage booster vehicle, the Chinese can place payloads ranging from 1150 to 4000 kilograms, in orbits ranging from 1000 to 200 kilometers in height and thus alone offers a wide range of capabilities.[46]

While the CZ-2E is presently their largest lifter, actually a CZ-4 with strap on boosters, it is only comparable to the Soyuz-TM lifter used by the Russian Space Program. The Soyuz-TM capsule weighed in at 7.25 tonnes and carried three people, and the CZ-2E could lift 8.8 tonnes into the same 200 kilometer Low Earth Orbit (LEO).[47] Various hints have

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[43] _____, "China's Space Industry Takes Off", Beijing Review, May 21-27, 1990, pp 17-21. 19

[44] Clark, Phillip S., "Chinese Launch Vehicles--Chang Zheng 1", Jane's Intelligence Review, November 1991, p 508

[45] Clark, Phillip S., "Chinese Launch Vehicles--Further Details", Jane's Intelligence Review, June 1993, pp 273.

[46] Clark, Phillip S., "Chinese Launch Vehicles--The Rest of the Story", Jane's Intelligence Review, October 1992, p 472.

[47] Ibid, p 473

linked its use may be connected with China's future manned space program. Possibly connected with their space station program, the Chinese have also acknowledged at different times a configuration of a booster in the same class as the US Saturn-1/1B.[48] This US vehicle could orbit 20 tonnes into LEO[49], and was responsible for lifting the infamous Skylab into orbit.

Perhaps the most important figure from both a commercial and military standpoint, is China's launcher reliability rate. "China has launched more than 40 satellites (including those launched for other countries) with a very high success rate of 96%--better than that achieved by other carrier rockets of the world."[50] Only European Ariane rockets come close with a 92% reliability rate.[51] The US rockets are considered too unreliable, Russia's unavailable for commercial purposes, and Japan's too expensive. Clearly China is positioned to become a leader in commercial space lift.[52] Considering insurance figures largely into the cost of satellite deployment, China's reputation as a reliable, inexpensive provider of lift service is crucial in such a highly competitive industry.

With this reliable capability and infrastructure, destined to ambitiously improve, China can launch a range of increasingly sophisticated satellites for military and civilian use. Besides domestic telecommunications use, these satellites can also support navigation, communications, and other command and control functions. In addition, purely military satellites can support traditional military missions such as intelligence, surveillance, and

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[48] Clark, Phillip S., "Chinese Lauch Vehicles--The Rest of the Story", Jane's Intelligence Review, October 1992, p 473
[49] Ibid
[50] Hong, Junhao, "The Evolution of China's Satellite Policy", Telecommunications Policy, March 1995, p 117.
[51] Ibid
[52] Ibid, 129

reconnaissance. These capabilities are force multipliers, if not necessities, to any modern military operation or campaign.

China's satellite telecommunications industry is now among the world's top 10 most advanced. In eight years, from 1985 to 1992, China's telecommunications capabilities increased more than 20 percent annually, surpasses the 15. 4 percent record set by Japan during its 'take-off' period. "In order to handle this astronomical growth, during the 1980s, China launched five telecommunications and broadcasting satellites."[53] This telecommunications growth is in part fueled by the economic expansion and in turn supports it as well. What must also be remembered is that civilian communication satellites are also used for military communications as well.

Many other types of satellites are dual use, even if not admittedly so. According to the Beijing Review, during the Seventh Five-Year Plan (1986-1990), China successfully developed and launched 11 applied commercial satellites of four distinct types. Of the eleven, four domestic communications and broadcast satellites (three were DFH-2A and one earlier DFH-2), five were recovery satellites (100 percent recovered), and two meteorological satellites (one was a FY-1 and a second of an unknown class).[54] While satellite research has not only contributed to scientific research, the author of the Beijing Review article, goes on to admit it also helps towards "modernizing China's armament industry and strengthening national defense power."[55]

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[53] Hong, Junhao, "The Evolution of China's Satellite Policy", Telecommunications Policy, March 1995, p 128.
[54] Guirong, Min, "The Development of China's Satellite Industry", Beijing Review, December 30 to January 5, 1992, pp 24-25
[55] Ibid

Another article, from Jane's Intelligence Review (JIR) states that in the future, "the CZ-3A will be used to launch the new generation Chinese DFH-3 communications satellites although the vehicle will also be available for commercial launches."[56] Unlike the Beijing Review article, the Jane's article interestingly seems to imply the DFH series is a military communications satellite. Perhaps at least it is a dual use satellite.

Also of interest is the aspect of recoverable satellites. These are reported by Phillip Clark of JIR, to be involved with remote sensing and microgravity research.[57] The first such satellite was designated with the nomenclature of FSW-1 (Fanhui Shi Yao Gang Weixing / recoverable remote-sensing test satellite). He goes on to state the it is "unclear what equipment was carried aboard the [first] satellite but, presumably, prototype ground and stellar cameras were under test.[58] Improvements were made to this prototype: Increasing its orbit duration to five days, reducing the structural mass, adding a CCD camera, including real-time telemetry, and adding a radar transponder to aid recovery.[59]

After 14 launches of the FSW-1 series, a dash 2 series was first launched in August 1992, on the maiden flight of the CZ-2D booster. This second version increased the weight of the capsule from 1800-2100 kilograms to 2400-2500 kilograms and the descent payload doubled to 300 kilograms. It performed a nine day mission, and three orbital changes. Flight duration for the FSW-2 series is designed for up to 15 days, although 16 days have been accomplished due to bad weather at the recovery site.[60] These satellites, like their DHF

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[56] Clark, Phillip S , "Chinese Lauch Vehicles--The Rest of the Story", Jane's Intelligence Review, October 1992, p 473

[57] Clark, Phillip S , "China's Recoverable Satellite Programme", Jane's Intelligengce Review , November 1993, p 517

[58] Ibid

[59] Ibid, p 518

[60] Ibid, p 519

counterparts, are also not for commercial use, but are most likely used for ISR. The US has used recoverable satellites, recovered by JC-130s stationed in Hawaii, for this very same purpose.

Finally, China wants to have its own GPS constellation. " 'Real-time correlating receiving equipment' designed for China's 'Twin-Star' Satellite equipment' Global Positioning System (GPS) has been certified by an expert group as being at the international state of the art."[61] As the name suggests, China's 'Twin-Star' may be an attempt to reap the same benefits as the United States' GPS system. To date, however, only successful ground testing has been performed and even a first member of a Chinese GPS constellation has yet to be deployed.

All this demonstrated capability has made a few folks watchful concerning the extent of the technology being transferred to China. Perhaps unfortunately, as in the aforementioned Xian station, the United States and other western countries have been helping China immensely, without curtailing possible military applications of the technology being transferred. "[T]he concern is that by selling the satellites, the United States is releasing information about satellite launching. This has major military implications for helping the Chinese to release and target multiple nuclear warheads at specific points in space."[62] Mr. Sokolski, former deputy for nonproliferation in the Office of the Assistant Secretary of Defense for International Affairs, warns that such technology exchange "could violate the

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[61] Zaozao, Yu, "Twin-Star GPS Project Sees Further Advances", Beijing Keji Bao, December 17, 1994, p 1 [FBIS trans JPRS-CST-95-003]

[62] The United States authorized the sale of two satellites to be launched on Chinese rockets. Oliver, April, "The Dragon's New Teeth", The Nation, February 21, 1994, p 231

very restrictions the US has accused the Chinese of infringing"[63] with regard to the proliferation of ballistic missile technology.

Whether it be satellite kick motors, coupling load analysis, or Cray computers, any technology transfer, Mr. Sokolski goes on to say that this "would not only help China upgrade its military solid rocket systems, it would directly assist China's efforts to develop advanced, highly accurate, multiple independently targetable reentry vehicle systems (MIRVs) for its ballistic missile program."[64] Such improvements to China's ballistic missile program are especially disturbing, given China's less than status quo nature, and its arms sales which have threatened the stability of several regions of the world.

Altogether China has a robust, and in some regards, threatening space program. Modern launch facilities are been completed and upgraded, reliable launch vehicles are being designed and flown, and a host of satellites demonstrating great capability are being prepared to go into orbit. Unfortunately, many of these capabilities also have military purposes, if fact in the beginning with the nuclear armed Deng Feng One ballistic missile, such were the sole purpose of their creation.

Strategic Nuclear Forces

> "China is now the only country in the world that targets the United States with nuclear weapons."
> - Gerald Segal, senior fellow, International Institute for Strategic Studies in London[65]

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[63] Sokolski, Henry, "Unseen Dangers in China", Armed Forces Journal, February 1994, p 25
[64] Ibid
[65] Post, Tom, "Prying Open a Secret Army", Newsweek, October 31, 1994, p 49

China's feelings about its atomic arsenal are quite clear. Deng Xiaoping said, "If China had not exploded [the] atom[ic] and hydrogen bombs in the 1960s and launched satellites, it would not be considered one of the three big powers and would not occupy such a position in the world today."[66] Being a nuclear power is important to China not only from a military standpoint, but it is a matter of national prestige. So important is this nuclear arsenal, that despite pressure from world opinion, China continues to test its nuclear warheads at the Lop Nor test sight, as she attempts to increase its yield to weight ratio and make other improvements.[67]

Although the Chinese have been very effective at keeping details of their nuclear arsenal secret, the mainstay of Chinese nuclear forces is the ballistic missile. These have ranges of 1,700 to 13,000 kilometers, but only a handful are capable of hitting targets in North America. Along with their domestic space program and launch capability, the Chinese continue to develop strategic nuclear weapon systems with increased range, accuracy, solid fuel technology, multiple warheads, and mobile launching platforms.[68]

As mentioned in the previous section, from China's first missile the DF-1 was developed solely for military use. Amazingly, according to two analysts, "There is no evidence that any overarching strategic doctrine informed Chairman Mao Zedong's decision to proceed with the strategic missile program in the mid-1950s."[69] Instead the program was technology-

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[66] _____, "China's Space Industry Takes Off", Beijing Review, May 21-27, 1990, p 21.
[67] Lockwood, Dunbar, "China's Nuclear Test Prompts U.S., Others to Review Test Policies", Arms Control Today, November 1993, p 20
[68] _____, "Chinese Nuclear Forces 1993", Arms Control Today, November 1993, p 57.
[69] Lewis, John Wilson and Di, Hua, "China's Ballistic Missile Programs", International Security, Fall 1992, pp 5-40

driven until the early 1980s. Nevertheless, from this early rocket and its successors, China has strove to maintain a credible deterrent nuclear force.

To counter the perceived US nuclear threat to their homeland, as early as 1961 the Chinese sought to build as soon as possible a missile that could reach the US. Range seems to be the driving design criteria for China's missile deployment. The aforementioned DF-1 only had a range of 2,500 kilometers, which was sufficient to cover Japan and hit US bases at Clark Field and Subic Bay in the Philippines with the 2000 kilogram warhead.[70] The DF-2 was to have a much shorter range to hit Japan. Due to technical difficulties with the DF-1, the DF-2 was actually flight tested first in November 1965. Since, the range required to hit North America was estimated to be 10,000 kilometers, a new missile with this range was designated the DF-3. The DF-3 was first deployed in May, 1971.[71]

The DF-4 and DF-5 soon followed, despite the setbacks caused by the Cultural Revolution. Initially, the DF-4 was designed to hit the B-52 base on the island of Guam and the DF-5 was intended to cover the entire continental United States from siloed basing in northern China. Despite the many new technologies required by the DF-5, its deployed was rushed due to the pressure of the Sino-Soviet conflict. Both rockets became fully operational by 1981, the DF-5 being held up, despite the emergency rush, due to silo construction and certification. As improvements were made to the DF-5, the DF-5A is now capable of carrying a 3,200 kilogram payload over 13,000 kilometers[72]

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[70] This was the estimated weight required for the hydrogen bomb already in development.
[71] Lewis, John Wilson and Di, Hua, "China's Ballistic Missile Programs", International Security, Fall 1992, pp 7-16
[72] Ibid, 16-19

The DF-6 was first proposed in July 1966. It was hoped that by adding a third stage to the DF-5, the missile could strike the Panama Canal. Moreover, it was hoped the DF-6 could strike the continental US from the south, penetrating the American homeland at its weakest point in the early warning network. Because of technical delays and warming relations with the United States, the DF-6 program was canceled in October, 1973.[73] Appendix 2 lists the operational missiles of China and summarizes their capabilities.

While range was the design criteria, amazingly it did not drive strategic warfighting doctrine. According to Lewis and Di, both members of Stanford University's Center for International Security and Arms Control, "Although [the designers] world was technologically driven, a strategic retaliatory doctrine was implicit in the target selection." The missiles' users in the Second Artillery also did not have access to studies on nuclear strategy. Nevertheless, by the 1970s there were rudimentary strategies, often improvised, with imaginary targets for each missile. Of course with a proclaimed no first use policy, these missiles would first have to survive a nuclear counter force strike.[74]

So, the Chinese then spent the next decade exploring with various basing modes to enhance survival; better silos, cave storage and the 'shell-game' of false silos (without the interconnect rails seen in similar US basing proposals).[75] After much debate and false starts, what resulted was a series of virtually identical road mobile, solid fueled missiles. The DF-21/31/41, each carrying a 500 kilogram warhead for a 200-300 kiloton yield, differed only in their capable range. SLBM variants for the DF-21 and -31 are the JL-1 and -2 respectively.

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[73] Ibid. 19
[74] Ibid 20-21
[75] Ibid 22-25

Yet as China's doctrine moves toward the new "Local Wars" concept, its strategic force will need to evolve as well. "While a crude and limited nuclear force remains the strategic wherewithal to deter and, if necessary, retaliate against any aggression of a scale that threatens vital national interests, such a force is hardly of use in resolving small-scale conflicts.[76] China appears set upon fielding many road mobile missiles to ensure force survival for a possible retaliatory capability.

With this new force, a valid assumption would be that the Second Artillery has finally worked out a war-fighting doctrine for these numerically expanding mobile forces. As seen from the development of the DF program, the Chinese will at least have a reason for the required ranges of the DF-21/31/41 series.

One indication of a new doctrine, is that the crews are now actively training in a strategic missile simulation training system. Experts described the system as, "combining the war time and peace time use of strategic missiles, integrating their training and deployment, and effectively improved their survivability."[77] Professor Huang Xianxiang, an expert at the first academy in launching and targeting who advanced the concept, "believed that China must put more efforts into simulation in order to improve its strategic missile survivability."[78] This is especially true since the article in which this quotation appeared reiterated China's no first use policy.[79] Demonstrating a desire for continued improvement, this new simulation appears to have augmented or replaced an older training program, titled as the "Second

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[76] Yuan, Jing-Dong, "China's Defense modernization Implications for Asia-Pacific Security", Contempory Southeast Asia, June 1995, pp 67-85

[77] Bo, Chang, and Jiajun, Zhang, "Strategic Missile Simulation Training System Developed", Beijing Keji Ribao, July 27, 1994, p 1 [FBIS trans JPRS-CST-94-019]

[78] Ibid

[79] Ibid

Artillery Intelligent System for Military Training and Testing." This older system used computers with graphic displays and audio components, in order to save the State large expenses in maintenance, repair, and training.[80]

In short, China appears to have a strategic nuclear weapons program whose capability is only accelerating in nature. Depending on the size of the road mobile missile force fielded, China could pose some serious concerns to those wishing to see permanent declines in world totals of ICBMs. Finally, given the increases in simulation training, these strategic forces may now be integrated as an important component of the new "Local Wars" doctrine.

Theater and Naval Missile Forces

An interesting outgrowth of the solid fueled, mobile strategic missiles, is a vigorous intermediate conventional missile program. While possessing several longer range missiles, China also has developed intermediate ranged missiles for important military sales and as useful military instruments of power. One of these longer ranged missiles, the DF-25 is essentially a DF-31 with the third stage replaced by a 2000 kilogram conventional warhead. By the way, this only coincidentally gave the DF-25 the same range as the DF-21, which is 1700 kilometers. Perhaps the best explanation the genesis of the DF-25 comes from the previously introduced Lewis and Di,

> Although it may seem odd to some Western strategists, the purpose of the DF-25 would be to defend the Nansha Islands in the South China Sea. The Chinese have neither aircraft carriers nor

[80] Shouqin, Chen and Niu, Mo, "Intelligent System for Military Training and Testing", Beijing Keji Ribao, June 25, 1990, p 2 [FBIS trans JPRS-CST-90-024]

inflight refueling capability. Conventional-tipped ballistic missiles, if accurate enough, might provide quick fire support over long distances.[81]

The DF-25 may only be a temporary weapon system substitute, one that China has available as an offshoot of its strategic missile development program. What is also a possibility is that China may use these systems as a permanent doctrinal means to conduct warfare on the operational level.

As further evidence using these weapons for permanent operational missions, unlike the DF-25, the DF-15 (M-9) and DF-11 (M-11) were developed specifically for tactical use, as well for foreign sales in their "M" versions. In fact the director of the First Academy told his colleagues: "For money, develop the DF-15; for fame the CZ-3."[82] The CZ-3, as it so happens, uses something similar to the DF-11's first stage as the component for its second stage. Appendix 3 has a summary of these missiles and their capabilities.

In fact, China recently demonstrated the willingness to use these short ranged weapons provocatively. "The show of force . . . across the Taiwan Strait had as its centerpiece a series of surface-to-surface missile launches, an impressive display in which at least five of six weapons hit an ocean impact area north of Taiwan."[83] This impact area was barely sixty miles from Taiwan's northern coast.

It has been speculated that this test's purpose was two-fold: First to advertise the M-11 for foreign missile sales, and second to warn Taiwan's President Lee Teng-hui before the

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[81] Lewis, John Wilson and Di, Hua, "China's Ballistic Missile Programs", International Security, Fall 1992, p 31
[82] Ibid, p 35
[83] Fulghum, David A and Mecham, Michael, "Chinese Tests Stun Neighbors" Aviation Week & Space Technology, July 31, 1995, p 23

country's elections of the one-China policy.[84] If this is true, it is a very interesting use of aerospace power and may be demonstrative of Beijing's determination and aggression. This demonstration, as well as continued foreign sales of these missiles and their technology, has American politicians enraged.

Democratic Sen. John Glenn has co-authored legislation with Helms to impose sanctions on China if it is seen to violate the Missile Technology Control Regime[85] . . . One of the first issues that will have to be wrestled with is China's suspected sale of M11 missiles to Pakistan. A related issue is Beijing's missile- and nuclear-technology transfers to what Washington considers "rogue states" in the Middle East.[86]

In reply to these protests, "Beijing had argued that the M11 lay below the control-regime ceiling"[87] despite the fact that they are inherently capable of being upgraded to come underneath it. Nevertheless, to return to the First academy's director's quote, China made the missiles in part to make money, so it is unlikely that Senator Glenn's threatening legislation will have any effect on China's foreign military sales and technical assistance.

On the more tactical level, in what might be described as varying from crude to near state of the art in technology, China has fielded a several short range of anti-ship missiles which she has continually improved in range and accuracy. This category of Chinese weapon systems is perhaps the most famous, recalling the continued concerns about Chinese-made Iranian Silkworms in the Persian Gulf. Use in the Gulf, however, showed that even the

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[84] Ibid

[85] The Missile Technology Control Regime (MTCR) was established in 1987 and initially consisted of the United States, the United Kingdom, France, Japan, West [sic] Germany, Italy, and Canada. It bars the transfer of technology for missiles capable of delivering a payload of 500 kg a distance of 300 km; however, there is no enforcement mechanism involved. For a good discussion, See Rachel Schmidt, U.S. Export Control Policy and the Missile Technology Control Regime, The RAND Corporation, January 1990.

[86] Chanda, Nayan, "Storm Warning", Far Eastern Economic Review, December 1, 1994, pp 14-15.

[87] Ibid

more crude versions have proven their capability against unsophisticated naval targets in the region. With this class of weapon, mounted on shore based, ship based, and naval bomber aircraft, China may possess the capability for sea control in her areas of immediate interest.

These weapon systems grew primarily out of China's need for coastal defense and at sea missile capability.[88] China's initial missiles were Soviet-produced SS-N-2A (STYX), direct from Soviet factories and probably shipped as late as 1962.[89] After relations soured with the Soviets, China had to produce copies of this missile herself, and named them the SY-1. In much the same story as the development of the strategic rocket program, slowly China developed follow-on improvements. The latest supersonic additions, the C-101 and the HY-3 represent impressive capability, as "There are no similar programmes elsewhere in the world, other than the French and German joint development of the Anti-Navire Supersonique missile (ANS). This latter program had been seriously delayed due to technical difficulties.[90]

Appendix 4 has a summary of these missile's capabilities. Note that the HY class is shore or ship deployed, while the C series is air launched. The primary aircraft for this role are naval versions of the outdated Xian H-6 (Tu-16) and even more antiquated Harbin H-5 (Il-28), or the Chinese designed SH-5 amphibian aircraft. While all these missiles have been judged as unsophisticated by Western standards in terms of maneuverability and ECCM[91], the effectiveness of the HY-2 is well known from the Iraq-Iran War.[92] Even so, the C-801 is assessed to be as capable as the earlier versions of the of the infamous Exocet.[93]

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[88] Jacobs, G., "China's Naval Missiles, Asian Defence Journal, October 1990, pp 65-75
[89] Ibid, p 66
[90] Lennox, Duncan, "China's New Supersonic Anti-ship Missile", Jane's Intelligence Review, pp 512-513.
[91] Ibid
[92] Ibid, Jacobs, p 70.
[93] Ibid, p 72

All told, as Lewis and Di have indicated, these theater missiles may represent substitutes for other weapons and platforms used in the West, or they may be somethng permanent in the Chinese arsenal. As China continues to nurture and improve these technologies, they may become even more threatening to its neighbors and Western weapons systems which may encounter them in many parts of the globe due to Chinese arms sales.

Future Indicators

For China, there are many areas to improve in militarily as she modernizes. Some of these areas have been acknowledged, but for one reason have not been pursued. As far as the PLAAF is concerned, acquisition of the 26 Su-27, even in such limited numbers is beneficial and may reap doctrinal benefits beyond the mere count of airframes. If the F-10 becomes operational in sizable numbers, it too would represent a welcome increase in capability. In China, as in many countries, sometimes expected and needed weapon systems never make it past prototyping. "For more than a decade China has been developing a new supersonic bomber, the Hong-7, some of which presumably would have nuclear missions. The first prototype flew in November 1988, but it has yet to enter service."[94]

Yet other needs of the PLAAF are being met and deficiencies corrected. "The inflight refueling technology obtained from Moscow will enable Beijing to expand its reach to Taiwan."[95] This of course is of grave concern to Taiwan, even with China's outdated air forces, as a needed technology brings a whole new dimension to the picture. Hei You-long, a

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[94] _____. "Chinese Nuclear Forces 1993", Arms Control Today, November 1993, p 57.

[95] Hickey, Dennis Van Vranken and Harmel, Christopher Craig. "United States and China's Military Ties with the Russian Republics", Asian Affairs, Winter 1994, p 247.

noted Taiwan expert tells it this way, "Before Peking acquires [sic] the technology, only some 1,000 of China's 6,000 military aircraft could pose an immediate threat to Taiwan . . . the combat aircraft now deployed in Sichuan and Sinjiang can also pose an immediate threat to the security of Taiwan.[96]

As far as China's space programs are concerned, things seem to be on track toward some impressive goals. Space pioneer Yang Jiange and 30 other Chinese experts gave a report to the Central Committee on how "China could develop its own high-tech program" to counter the United States' Star Wars program. He went on to say that if not for the Cultural Revolution, "China's astronautics would be ten years ahead of what it is now."[97] Yet the plan to have Chinese astronauts in space by the year 2000 and a workable shuttle by the year 2020 seems remarkable despite this setback. With this impetus and continued funding, future Chinese space infrastructure and capability will continue to improve dramatically.

Concerning the mystery of FSW and other satellite payloads, translated Chinese press articles reveal some interesting future satellite capabilities as well. For instance, a new adaptive tracking algorithm with high precision capability to track a space moving target via its infrared images has been tested with very positive results.[98] China has also developed the finite element models for a lightweight scanning mirror for space reconnaissance, models necessary to study the effects of its own motion and weight as a load while operating in microgravity.[99] Space borne sensors for maritime surveillance are seen to have the

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[96] _____, "Peking Seen More Threatening to Taiwan", Central News Agency (Taipei), August 25, 1992.
[97] Zhengling, Kou, "Yang Jiache Pioneer of China's Space Technology", Beijing Review, Jan7, 1991, pp 37-39.
[98] Jiang, Li et al, "High-Precision Tracking Algorithm for Space Infrared Spot Target Images", Beijing Yuhang Xuebao, April 1992, pp 41-47 [FBIS trans JPRS-CST-92-011]
[99] Danying, Fu, "Study of Lightweight Mirror for Space Detail Reconnaissance Camera", Beijing Zhongguo Kongjian Kexue Jishu, August 1992, pp 33-38 [FBIS trans. JPRS-CST-92-025].

advantages of real-time imagery, wide-area monitoring, and economical.[100] If these capabilities were not enough in variety, the SJ-4 satellite, launched by the DZ-3A, carries six instruments used for charged particle and radiation-effect experiments. It is the first of a new series of long-life satellites, and was designed in only two years. Interestingly, it was placed in a highly elliptical orbit with a perigee of 203 km and an apogee of 36,000 km. This would take the SJ-4 through LEOs, the inner Van Allen belts, and nearly out to the geo-synchronous GPS satellite orbits.[101]

Last of all the significant developments, in what is undoubtedly a major upgrade in Surface-to-Air-Missile capability, China as recently purchased 100 SA-10c missiles from the former Soviet Union. "The S-300 [SA-10c] provides the PLA with a significant boost in its territorial air defenses."[102] Appendix 5 contains a list of current Chinese SAMs and some of their capabilities. Importantly, most SAMs have been developed from reverse engineering systems made in other countries. Note also that the SA-10c is a monumental increase over current Chinese system, even ignoring its anti-ballistic missile (ABM) capability.

More importantly, such a sophisticated weapons system as the SA-10c also allows China to reverse-engineer its anti-ballistic missile capability. Perhaps this is the true purpose in the change of mission for the town of Lanzhou--in order to become the new ABM "surface to air missile city". Equally important, employed as a Chinese-built naval variant, both the its SAM and ABM capability could be placed on several new classes of ships now being built.

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[100] Peizhong, Wu, "Prospects for Satellite Remote Sensing in Oceanography Outlined", Beijing Zhongguo Hangtian, October 1993, pp 8-11 [FBIS trans. JPRS-CST-94-004]

[101] Qizheng, Hu, "Description of the SJ-4 Satellite", Beijing Zhongguo Hangtien, November 1994, pp 13-15 [FBIS trans JPRS-CST-95-003]

[102] Hickey, Dennis Van Vranken and Harmel, Christopher Craig, "United States and China's Military Ties with the Russian Republics", Asian Affairs, Winter 1994, p 246

Conclusion

While Lewis and Di may be wrong about China's use of Theater Ballistic Missiles as a substitute for traditional Western platforms, China certainly has the capability to employ a range of unmanned systems to support her military operations. In the short term, PLAAF will remain a numerically impressive manned air force, but only a defensive force governed by defensively minded doctrine, which is under-equipped and under-trained. Over the course of the next few years, the US and her allies will continue to watch China's modernization to determine if the new "Local Wars" doctrine means the offensive use of force. Presently what offensive aerospace forces exist are found in the strategic, operational, and tactical weapons already possessed by the Chinese military. As indicated, these missiles have been viewed as one of the best ways to improve the operational effectiveness of Chinese Armed Forces in the short term, but perhaps they represent a permanent way of war fighting for China's "Local Wars" 'hit and run' doctrine. As opposed to manned air forces, these three levels of missile forces, strategic, operational, and tactical, may represent the real and permanent offensive power of the Chinese military in the years to come.

APPENDICES

APPENDIX 1: PLAAF Manned Aircraft[103]

FIGHTERS	IOC (Estimated)	PRODUCTION	NUMBER (Approximate)
Mig-15 and 15bis	1950	None since 1956	1,300
F-5 (Mig-17)	1956	None since late 60s	767
F-6 (Mig-19)	1963	None since 1977	1800
F-7 (Mig-21)	1966	Yes, latest version -3	600
F-8 (Mikoyan Ye-152A)	1979 1984 (-2)	No Yes, 20 to 24 per month	150
FB-7	1988	No, no engines available	2
Su-27	1991	Pending	26 (+24, poss. Mig-31s, delayed)
F-10	est 2000	Pending	Unk
Bombers			
Tu-4 (Soviet B-29)	1951	No, Retired mid-80s	100
B-5 (Il-28)	1952	No, Retired 1988	Unk, (Navy 70)
B-6 (Tu-16)	1959	Yes, Naval variant and proposed tanker & EW platform	Unk, (Navy 30)
Ground Attack			
A-5	1965/70	Yes, through 1998	Unknown

[103] Data Compiled from three sources
Allen, Kenneth W., Krumel, Glenn, and Pollack, Jonathan D., China's Air Force Enters the 21st Century Project AIR FORCE, RAND Corporation, MR-580-AF, 1995 Appendix B, Allen, Kenneth W., People's Republic of China, People's Liberation Army Air Force Defense Intelligence Agency, U.S. Government Printing Officer, 1991 Appendix E, and Yuan, Jing-Dong, "China's Defense modernization: Implications for Asia-Pacific Security", Contempory Southeast Asia, June 1995, pp 67-85

APPENDIX 2: PRC Nuclear Delivery Vehicles[104]

Designator (Western Designator) [Related Civilian use Launchers]	IOC	Siloed with Nuclear Warhead(s)	Range (Kilometers)	Warhead (Kilotons or Megatons)
DF-2 (CSS-1) [None]	1966	50	1200	1x15-20KT
DF-3 (CSS-2) [None]	1969	100	<2700 2000 with 1500kg warhead[105]	1-3 MT 3 MIRVed 100Kt
DF-4 (CSS-3) [CZ-1, CZ-1D]	1970	8 (with 30 built)	<7000	1 x 2 MT [100kg , 300kg LEO]
DF-5 (CSS-4) [FB-1, CZ-2A, CZ-2D, CZ-2E, CZ-3, CZ-3A, CZ-4A]	1979	10 (with 20 built)	>10000	1 x 5 MT [200 km/4000 kg to 1000 km/1150 kg]
DF-21/JL-1	1985	Unk	1700	600
DF-31/JL-2	mid 90s	0	8000	700
DF-41	late 90s	0	12,000	800

[104] Data compiled from three sources
Lennox, Duncan, "China's Development of Ballistic Missiles", Jane's Intelligence Review, August 1991, pp 374-375, Clark, Phillip S., "Chinese Launch Vehicles--Chang Zheng 1", Jane's Intelligence Review, November 1991, pp 508-511 and "Chinese Launch Vehicles--The Rest of the Story", Jane's Intelligence Review, October 1992 pp 469-472

[105] Between 30 and 50 DF-3A configured in this manner sold to Saudi Arabia in 1988, Ibid Lennox, p374.

APPENDIX 3: Theater Ballistic Missile Forces[106]

Ballistic Missiles Chinese Designator [Western designator]	**IOC**	**CEP** (meters)	**Range** (Kilometers)	**Warhead** (kilograms)
M9[107]/DF-15	1988	300 w/terminal guidance	600	500
M11/DF-11	1988	300	300	500
DF-25/ M18?[108]	mid-90s	300	1700	2000

[106] Data compiled from three sources
Lennox, Duncan, "China's Development of Ballistic Missiles", Jane's Intelligence Review, August 1991, pp 374-375 and "China's New Supersonic Anti-ship Missile, Jane's Intelligence Review, November 1992, pp 512-3 and Lewis, John Wilson and Di, Hua, "China's Ballistic Missile Programs", International Security, Fall 1992, pp 5-40

[107] The M designation refers to the export version, as opposed to the DF nomenclature for domestic use

[108] Little is known about the M18 A model of an M18 missile was displayed in 1988, and this appeared to be larger than the M11, but similar in appearance with two stages and solid propellant motors Ibid Lennox, p 375.

APPENDIX 4: Naval Missile Forces[109]

Naval Missiles [Western designator]	IOC	Speed (Mach)	Range (Kilometers)	Warhead (Kilograms)
HY-1 [equiv SS-N-2A]	late 1960s	0.85-0.90	47	315
HY-2 [Silkworm, CSS-N-2]	late 1970s	0.90	95	513
HY-3	late 1980s	2.0	130-180[110]	513
HY-4 [ext range Silkworm]	early 1980s	0.85	135	500
C-601 [air launched Silkworm]	early 1980s	0.85	115	513
C-801 [equiv Exocet]	late 1980s	0.9	40	165
C-101	1988	2.0	45	300

[109] Data compiled from two sources.
Lennox, Duncan, "China's New Supersonic Anti-ship Missile, Jane's Intelligence Review, November 1992, pp 512-3 and Jacobs, G., "China's Naval Missiles, Asian Defence Journal, October 1990, pp 65-75.

[110] The Chinese claim they will soon be able to extend the range of this missile to this upper limit.

APPENDIX 5: PLA Surface to Air Missiles[111]

Designator [Western Designator]	IOC	Range (Nautical Miles)	Altitude (Feet)
HQ-1 [SA-2][112]	1958	13	60,000
HQ-2 [improved HQ-1]	1965	>13	Unk
HQ-7 [Crotale]	1988	6.6	13,000
HN-5 [SA-7]	Unk	2	10,000
PL-9 [equiv. Chaparral]	Unk	3.5	10,000
HQ-61 [SA-6]	late 1960s	6.8	40,000
PL-10 [Naval HQ-61]	Unk	Unk	Unk
KS-1 [Naval HQ-2]	1991	23	Unk
SA-10	1993	82	Unk

[111] Data Compiled from two sources
Allen, Kenneth W., Krumel, Glenn, and Pollack, Jonathan D., China's Air Force Enters the 21st Century Project AIR FORCE, RAND Corporation, MR-580-AF, 1995 Section 12 and Allen, Kenneth W., People's Republic of China, People's Liberation Army Air Force Defense Intelligence Agency, U.S Government Printing Officer, 1991 Appendix F.

[112] All these missiles except possibly the PL-9 and the SA-10 (to date) were reverse-engineered Ibid, Allen RAND

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